

DRAWING AMENDMENTS

There are no amendments to the drawings.

REMARKS

The following claims were pending in the application: 1 – 19 and 94 - 111

The following claims have been amended: N/A

The following claims have been cancelled without prejudice: 20 - 93

The following claims have been added: N/A

As a result of the foregoing Amendment, the following claims remain pending in the application: 1 – 19 and 94 – 111.

RESPONSE TO CLAIM OBJECTIONS

The Rejections under 35 U.S.C. § 103

In both the Office Action of March 3, 2010 and the Advisory Action of October 8, 2010, the Examiner has rejected claims 1-5, 94, 96, 97, 105, 109, and 110 as being unpatentable over Turdukulov (Masters Thesis, International Institute for Geo-Information Science and Earth Observation Enschede, The Netherlands), 2003, 1-78 in view of Subramaniam et al. (Deep-Sea Research II, 2002, 49, 107-121).

Applicant submits that the instant claims are directed to a method of determining the approximate *amount* of *coliform bacteria* in water from reflected light. The steps of the method include obtaining a measure of reflected light comprising the amount of light in at least three different wavelength ranges and determining the amount of the coliform by applying an algorithm. The algorithm as described in the specification preferably comprises a linear relationship between the approximate amount of the coliform bacteria and the sum of the ratio of the first frequency to the second frequency and the

ratio of the second frequency to the third frequency. Applicant respectfully submits that nowhere in the references cited by the Examiner is such a method disclosed or suggested. By using an algorithm that includes ratios of the measured reflectances in the method, the present invention is able to effectively determine the approximate amount of the coliform bacteria, not just determine a presence of the bacteria.

In the Advisory Action of October 8, 2010, the Examiner states that Applicant's arguments are not persuasive because "the instant claim 1 step b) only recites determining the approximate amount of the coliform in water from respective amount of light by applying an algorithm relating the respective amount of light at three wavelength ranges to the amount of coliform bacteria in the water." The Examiner states that the claims do not provide a limitation of an algorithm that comprises a linear relationship between the approximate amount of coliform bacteria and the sum of the ratio of the first frequency to the second frequency and the ratio of the second frequency to the third frequency.

Applicant respectfully submits, however, that claims should be given "their broadest reasonable construction in light of the specification as it would be interpreted by one of ordinary skill in the art." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321 (Fed. Cir. 2005). Therefore, it is entirely appropriate "to rely heavily on the written description for guidance as to the meaning of the claims." *Id.* at 1316-17. The Federal Circuit has also instructed that, under the broadest reasonable interpretation standard, the PTO must apply a construction that is consistent with the one that those skilled in the art would reach in light of the specification. *In re Hyatt*, 211 F.3d 1297, 1372 (Fed. Cir. 2000).

While the dictionary definitions may still be relevant to determining the meaning of claim terms, they are not governing when the claim terms are used with a different meaning in the context of describing the invention in the specification. The Federal Circuit has repeatedly adopted meanings of claim terms, as used in a patent specification, that are different from the dictionary meanings. See, e.g., *On Demand Machine Corp. v. Ingram Ind., Inc.*, 442 F.3d 1331 (Fed. Cir. 2006); *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374 (Fed. Cir. 2006); *Nystrom v. Trex*, 424 F.3d 1136 (Fed. Cir. 2005). The Federal Circuit has confirmed that the PTO must follow *Phillips* and give more weight to the meaning dictated by the patent specification than by dictionary definitions. See *In re Scott E. Johnston*, 435 F.3d 1381, 1384 (Fed. Cir. 2006) (citing *Phillips* in rejecting construction based on dictionary definitions).

Applicant, however, has amended claim 1 to recite an algorithm comprising a linear relationship between the approximate amount of the coliform in the water and the sum of at least one ratio of one light measurement to a second light measurement. Applicant respectfully submits that amended claim 1 is in proper condition for allowance and is not obvious over any prior art for the foregoing and further reasons discussed herein.

Here, the specification clearly describes the algorithm in the instant claims as a linear relationship between the approximate amount of coliform bacteria and the sum of the ratio of the amounts of light, respectively, in first and second wavelength ranges, and a ratio of amounts of light in respective second and third wavelength ranges. Paragraph 10 of the specification provides an algorithm consisting of $X \approx K + K \times (R32) + K \times (R43)$, where X is the approximate amount of coliform bacteria expressed in

colonies per milliliter; R21 is the value of the LANDSAT TM band 3 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and R43 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 3, after subtraction from atmospheric haze separately in each band. It is clear that the specification dictates an algorithm to be a linear relationship between the approximate amount of coliform bacteria and the sum of the ratio of the first frequency to the second frequency and the ratio of the second frequency to the third frequency. Accordingly, Applicant respectfully submits that the instant method uses such an algorithm as recited *supra*, and that the cited art does not do so. Thus, Applicant respectfully submits that the cited prior art does not render the present invention obvious.

Further, although the Examiner is correct that Turdukulov shows measurement of reflected light from water over various wavelength ranges, Turdukulov simply teaches determining suspended matter concentrations that only *include* pathogenic bacteria. Turdukulov does not provide any method to distinguish the concentration of any given suspended matter from the concentration of a specific type of bacterium. The disclosure in Turdukulov is very different from the present invention wherein the approximate amount of a specific type of bacteria is determined.

The Examiner proceeds from the deficient Turdukulov reference to reason that the disclosure of Subramaniam is such that it would have been obvious to combine the teaching of Subramaniam and Turdukulov to arrive at the present invention.

However, as explained in more detail below, Applicant respectfully submits that the teachings in Subramaniam fail to teach any aspect of the method of the present invention such that it cures the deficiencies of Turdukulov. Subramaniam simply

teaches creating a classification scheme through which cyanobacteria amounts are predicted from chlorophyll concentrations. Subramaniam further fails to teach a method in which quantitative amount of coliform bacteria are determined by relating all the values for the amount of light in the wavelength ranges to the amount of the bacteria in the water. Put another way, Subramaniam does not disclose nor suggest using an algorithm that implements *ratios* of measured reflectances to determine the amount any type of bacterium, and has no reasonable bearing on that determination as regards coliform bacteria.

Subramaniam teaches a multispectral classification scheme to detect cyanobacteria *Trichodesmium* in satellite data from Sea WiFS. The classification scheme taught in this reference is only valid for moderate chlorophyll concentrations of the *Trichodesmium* bacteria. In contrast, the present invention is not a method for determining a classification scheme. Instead, the present invention provides a method for determining the quantitative amount of coliform directly from an algorithm relating ratios of measured light reflectances obtained from LANDSAT TM.

The Examiner reasoned that it would have been obvious to combine Subramaniam with Turdukulov to arrive at the present invention in the following manner:

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to modify the method of quantifying water quality parameters such as OSM such as remote imaging spectrometry by Turdukulov et al. with utilizing the satellite imagery and algorithms to detect bacteria Subramaniam et al. because Subramaniam et al. determines the amount of cyanobacteria in water based on the same range of spectral ranges...that Turdukulov et al. uses for identifying TSM concentrations, which in turn correlate to OSM concentrations, concentrations of TSM correlates to OSM calculation that encompasses pathogenic bacteria, i.e. coliform and E.coli.

(Office Action of 3/3/2010 at pages 5-6).

Applicant respectfully submits that obtaining a quantitative number for the concentration of organic suspended material in water is simply not the same thing as determining an actual amount of a specific bacteria type. A concentration of organic suspended material (OSM) tells one nothing about the amounts of a specific bacteria species such as E.coli in that concentration of OSM. The concentration of coliform in a body of water, even within a range of turbidity, and having an amount of OSM, could range from zero to a much higher percentage.

Further, even if one were able to combine the teachings of Subramaniam with Turdukulov, one would still not arrive at the present invention, because Subramaniam's method of determining the amount of cyanobacteria is very different from the present invention. Simply, the algorithm of Subramaniam does not allow one to determine the amounts of coliform present because it does not involve *ratios* of the measured reflectances of light.

As such, Applicant respectfully submits that no aspect to Subramaniam's reference teaches a method of applying an algorithm relating the *ratios* of measured reflectances to the amount of bacteria present in a body of water. Subramaniam only discloses creating a classification scheme from chlorophyll concentrations to determine cyanobacteria concentrations and only discloses a linear relationship, not an algorithm that utilizes ratios of measured reflectances. Accordingly, Subramaniam does not cure the deficiencies of Turdukulov, and it would not have been obvious to one skilled in the art to combine Subramaniam with Turdukulov to arrive at the present invention.

Based upon the foregoing, Applicant respectfully submits that claims 1-5, 94, 96, 97, 105, 109, and 110 are patentable under 35 USC §103 even taking into consideration Turdukulov and Subramaniam.

CONCLUSION

In view of the foregoing amendment and accompanying remarks, Applicant respectfully submits that the present application is properly in condition for allowance and may be passed to issuance upon payment of the appropriate fees.

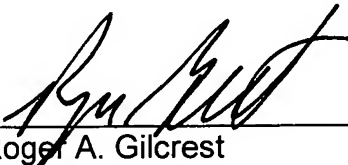
Telephone inquiry to the undersigned in order to clarify or otherwise expedite prosecution of the subject application is respectfully encouraged.

Respectfully submitted,

Date:

Dec. 16, 2010

By:



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